

Fence detail showing 8' fencing above ground and 2' fencing buried underground to serve as a dig barrier. Use a locking knot to tie the two together.



together, so animals are not able to penetrate the fencing. The deep crimp in the horizontal wire maintains fence tension and allows the fence to follow rough terrain.

- Provide sufficient site opportunity at US 93 accesses to facilitate safe entry to US 93.

Water & Hydrology

The objective of the water runoff guidelines is to maintain the chemical, physical and biological quality of wetlands and streams, to prevent contamination of groundwater, and to provide erosion and sediment control.

- Use bioswales composed of indigenous plant materials to minimize problems with water runoff. In wetland areas, create ribbon marshes that run parallel to the road that can be used to filter runoff. Ribbon marshes would consist of cattails and other appropriate plants. Bioswales to be conducted using best management practices (BMPs).
- Fill material may be excavated from selected areas. It may be permissible to excavate down to or near high water table in order to create artificial wetlands. In particular, this could occur in Schall Flats.
- Restore streams that have been channelized due to previous road construction related to US 93. Return stream to their original channels.
- In Ninepipe, incorporate structures to maintain healthy ecological systems and to allow wildlife passage.
- Incorporate a filtering system as part of the final road design that will prevent water from running off the road into sensitive wetland and riparian areas.
- Use urban cross-sections in selected populated areas in order to control runoff. All urban cross-sections shall include a stormwater collection and treatment system utilizing BMPs.
- In wetland areas, incorporate runoff treatment facilities to ensure

high water quality. Possibilities include bioswales, natural appearing constructed treatment ponds, and impervious lined channels planted with indigenous materials. The impervious lined channels would run parallel to the highway to capture, treat, and direct the flow of road runoff.

- Minimize the area of impervious surface in order to reduce runoff.
- Use a filtering system to prevent stormwater from discharging directly into wetlands or streams.
- Use treatment wetlands and bioswales composed of indigenous plant materials to treat paved surface water runoff in rural cross-sections. Constructed wetlands treatment systems are engineered systems that have been designed and constructed to utilize the natural processes involving wetland vegetation, soils, and their associated microbial assemblages to assist in treating wastewater. They are designed to take advantage of many of the same processes that occur in natural wetlands, but do so within a more controlled environment.
- Select vegetation for constructed wetlands from hydrophytic plants that are suitable for local climatic conditions and tolerant of the concentrations of nutrients, pesticides, and other constituents in the runoff stream and selected for their treatment potential. Give preference to native wetland plants with localized genetic material.
- Maintain wetland and riparian vegetation buffers to filter sediment and chemical pollutants carried by stormwater runoff.
- Maintain cross-highway hydrologic pathways by properly locating and sizing culverts.
- Size bridges to span the stream channel and 100 year floodplain. Minimize the placement of fill material in the floodplain.
- Preserve a site's natural drainage pattern, which is the result of its topography and vegetation.
- Utilize surface drainage systems such as swales, culverts and retention basins instead of closed, underground systems. Locate release points to minimize erosion if underground systems must be used.

Guidelines will help minimize impacts to water bodies along US 93.

